

Selection of nesting trees and the frequency of nest visits by Baya weaverbird¹

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(With five figures)

INTRODUCTION

Dr Sálím Ali inspired me to study birds. I am particularly delighted, therefore, to have an opportunity to join colleagues to felicitate this eminent ornithologist on this auspicious occasion by presenting a paper. Dr Ali was the earliest to investigate thoroughly the nesting habits of the baya weaverbird *Ploceus philippinus* (L.). I consider it appropriate, therefore, to report here some of my own observations on this fascinating species, so dear to village folk of India.

The baya weaverbird, noted for its complex, retort-shaped, dangling nest, woven with strips of grass and palm leaves, is familiar throughout the Indian subcontinent and the adjoining countries of Pakistan, Bangladesh, Burma, Thailand, Malaysia and Sri Lanka. The adult male baya is sparrow-like but streaked with brown, and with a thick bill and short rounded tail (Fig. 1). Being sexually dimorphic during the breeding season, the male acquires golden yellow plumage on the breast and head. The female is more drab, rather like a hen sparrow but for her stouter bill and shorter tail.

In India the baya selects a variety of trees, shrubs and other sites for nesting, the most favoured among them being the thorny acacias and certain species of palms. Moreover, the birds in each particular region seem to prefer a particular type of nesting site. To understand the reason for such a preference, I toured over all the Indian states and recorded as many baya colonies as possible. Details on the survey are summarized in this paper.

The baya nest is woven almost exclusively by the male who acquires a mate when the nest reaches the 'helmet' stage. The pair live together until the female has stopped laying and begins to incubate the clutch of 2-4 eggs. By this time the male completes the nest-weaving, including the tubular entrance. The hen hatches the eggs and feeds the young

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practically on her own. Detailed records were kept by watching the birds continuously for over 12 hours daily on the nest-building activities of males in a colony in a suburb of Calcutta, and the activities of hens brooding the eggs and nursing the young were also recorded. Details on the nest visits of the male as well as the female baya are also discussed in this paper.

HOST TREES, SHRUBS AND STRUCTURES OF BAYA COLONIES

The baya weaverbird in India has been found to colonize a surprising variety of plants. Structures like house eaves (Davis 1971a), telegraph and power lines (Ambedkar 1970), the sides of irrigation wells (Ali 1931, Crook 1960a, 1963) are occasionally selected for hanging their nests. When first travelling from the southern tip of India (Kanyakumari) to Calcutta in 1960, in observing the host plants of the baya, I felt that the birds of different regions seemed to prefer different species of plants for colonization. So I decided to make a survey of the Indian sub-continent covering all the states for studying the host range of baya colonies. During the following six years, I covered about 15,000 km in various states almost exclusively for observing the baya colonies by travelling in slow-moving trains, omnibuses, bullock carts or on foot. I should mention here that the survey was not designed statistically and so I might have covered proportionately more area in one region/state than in the others. But the proportion of the different host plants would remain more or less the same within a given region. Such a proportion between some states varies considerably.

Altogether 1485 colonies were recorded as shown in the Table. The number of nests per colony varied from one to about two hundred and fifty. About forty different species of plants were found to carry baya nests. Mathew (1972) has added a species to this list. In Uttar Pradesh alone, at least 25 species of plants were colonized.

It is clear from the Table that plants having prominent thorns, prickles or similar devices which may act as deterrents to predators, notably marauding monkeys and snakes, have attracted the baya most. About 68 per cent of colonies were located on such trees beset with thorns, prickles and similar defensive structures, besides those on electric or telegraph lines and inside irrigation wells which are very well protected from most predators. In some cases the nesting trees were not themselves spiny but were surrounded by thick brambles. The coconut (*Cocos nucifera*) and the areca palm (*Areca catechu*), both without spines, together account for about 15 per cent of the plants which were preferred in two regions for nesting. The tall, unbranched, smooth trunk and the long, swaying leaves which keep away many predators and provide a convenient source of leaf strips for weaving may compensate for lack of

TABLE
HOST PLANTS AND STRUCTURES FOR BAYA COLONIES IN DIFFERENT REGIONS OF INDIA

Plants/structures	Assam region	Andhra Pradesh	Bihar	Gujarat	Haryana & Delhi	Jammu & Kashmir	Kerala & Karnataka	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal (south)	Total
1. <i>Acacia</i> sp.	—	90	—	33	41	9	—	33	6	2	32	42	9	119	6	422
2. <i>Phoenix sylvestris</i>	1	242	7	—	29	1	—	20	5	9	2	—	14	33	—	363
3. <i>Borassus flabellifer</i>	—	32	16	—	—	—	17	—	4	15	—	—	15	12	64	175
4. <i>Areca catechu</i>	114	—	—	—	—	—	64	—	—	—	—	—	24	—	3	114
5. <i>Cocos nucifera</i>	5	3	—	—	5	2	—	10	6	3	1	5	—	12	—	102
6. <i>Zizyphus jujuba</i>	—	1	—	5	5	—	3	—	—	—	10	—	—	14	—	45
7. <i>Dalbergia sissoo</i>	2	14	—	—	2	—	—	2	—	—	3	—	—	3	—	36
8. <i>Prosopis</i> sp.	—	—	—	—	5	1	—	—	—	—	—	—	—	9	—	21
9. Tall grasses	—	—	—	—	3	5	—	—	—	—	4	—	—	5	—	18
10. <i>Butea frondosa</i>	—	—	—	—	1	—	—	1	5	—	—	3	4	1	—	17
11. Sides of wells	—	1	—	1	—	—	—	—	—	1	—	—	—	—	—	16
12. <i>Pithecolobium dulce</i>	—	8	—	—	—	—	—	—	—	—	—	—	—	—	—	9
13. <i>Tamarindus indicum</i>	—	3	—	—	—	—	—	—	—	1	—	—	—	3	—	4
14. Telegraph lines	25	—	—	—	—	—	—	—	—	—	—	—	4	—	—	32
15. Power lines	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
16. Others : thorny plants	3	—	4	—	—	1	3	—	3	—	1	2	2	14	4	37
17. Others : unarmed plants	4	2	6	2	3	1	7	—	—	1	1	2	—	23	1	52
18. Unidentified species	—	—	—	1	2	1	2	—	—	—	2	—	—	1	—	9
19. Eaves of houses & walls	—	—	—	1	—	—	2	—	—	—	—	—	—	6	—	9
Total	155	396	33	43	96	20	98	66	29	31	56	54	75	255	78	1485

s: Baya

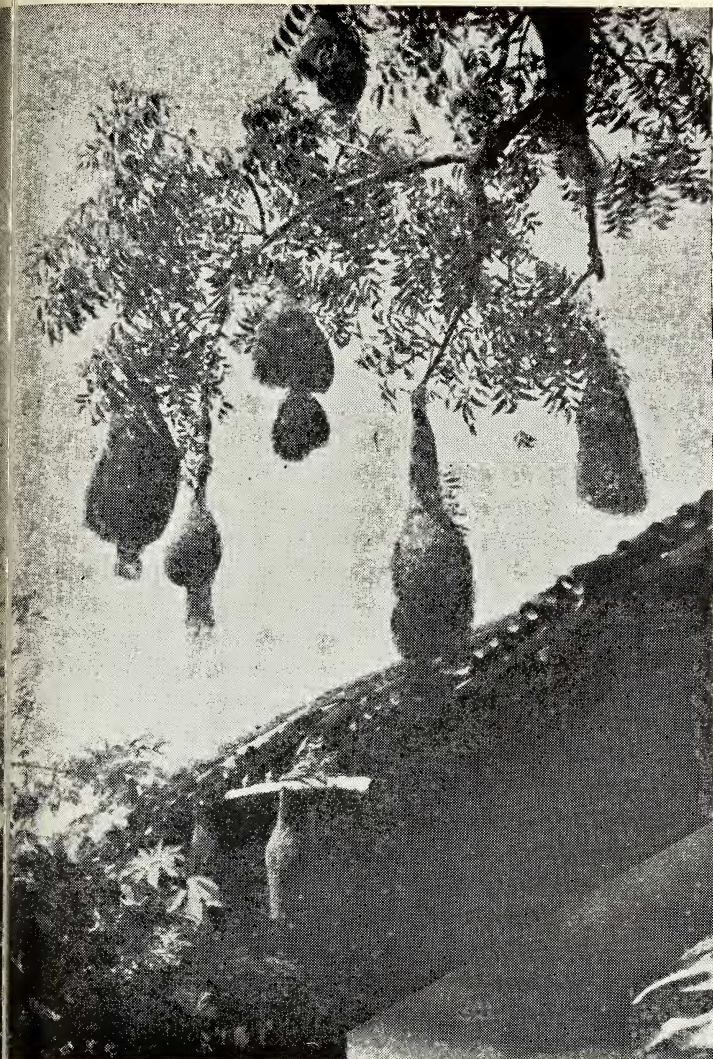


Fig. 2.

A large colony on a margosa tree standing close to a house. Nests are also hung on the roof of the house.

(Photo: Author)



Fig. 1.

A male baya weaverbird in nonbreeding plumage.

(Photo: Author)

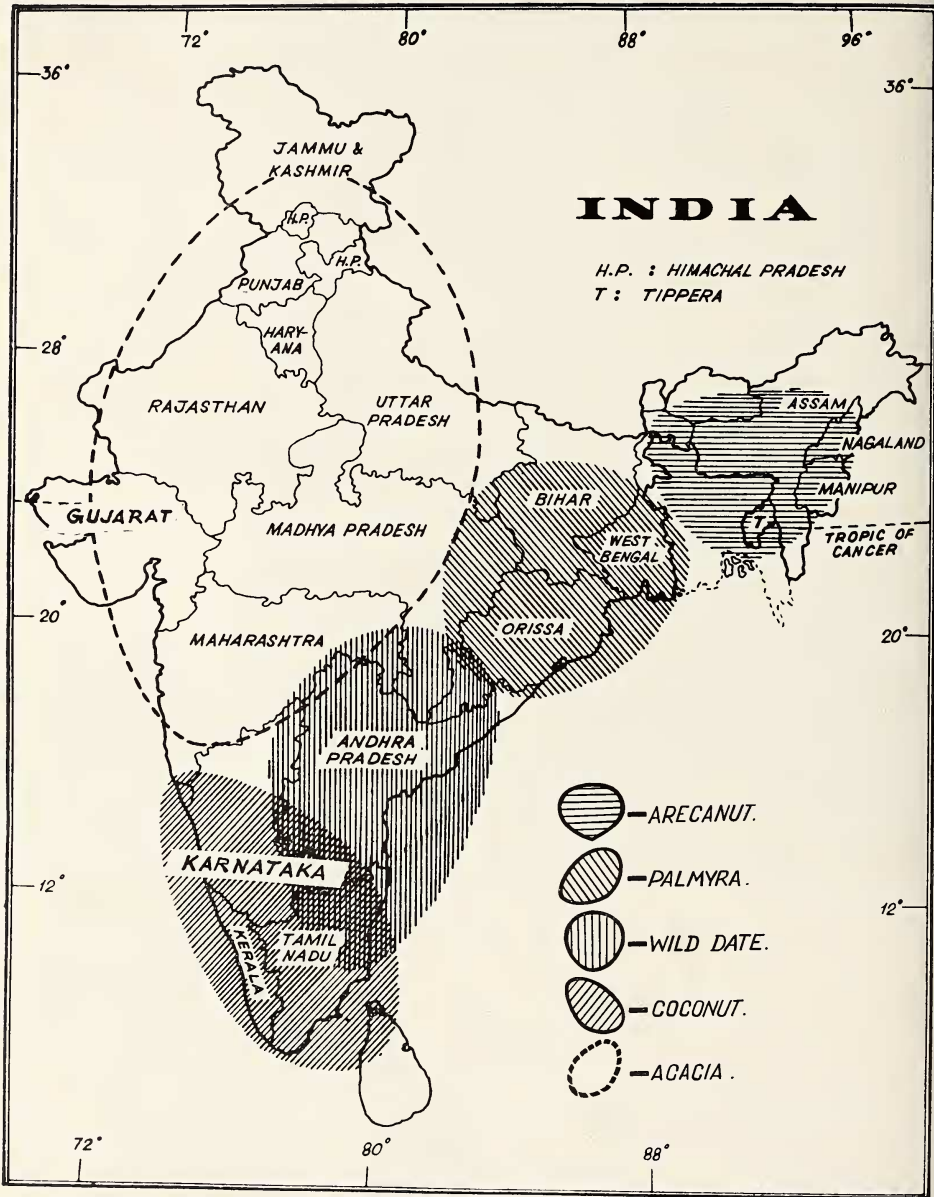


Fig. 3. Preferred host trees for founding baya colonies in different regions of India.

spines. Other unprotected trees are also used for nesting, like *Terminalia arjuna* whose trunk is extremely slippery. At other times, the bird builds nests on unarmed trees like margosa (Fig. 2), drumstick and mahua standing in close proximity to human habitations or whose stems are surrounded by a sheet of water. In most of these cases there is a good source of nesting fibre in the vicinity.

The most preferred host tree seems to be *Acacia* sp. With the exception of three states all have colonies on one or more species of *Acacia*. *Acacia arabica* and *A. leucophloea* are the most common species. The prominent and profuse thorns present all around the plant, the numerous slender branches that form a dense crown, and the tree's capacity to withstand waterlogging for long periods keep off most enemies including crawling predators like tree snakes, tree rats and even the curio-hunters. It is striking that even shorter acacias standing in water are preferred over nearby bigger ones of the same species on dry ground. As acacias are devoid of nesting fibre, it may be inferred that the safety of the nest and inmates becomes the foremost consideration in choosing a nest site and takes precedence over availability of nesting fibre or food.

Critical examination of the figures in the Table shows that the baya colonies in different localities seem to prefer different host trees or structures for nesting. For example, in the Assam region, over 84 per cent of the colonies were located on *Areca* palm, and about 60 per cent of the colonies in Andhra Pradesh were on wild date (*Phoenix sylvestris*): see map of India in Fig. 3. In the region of Bihar, Orissa and south-west Bengal (presumably Bangladesh also), palmyra (*Borassus flabellifer*) is the preferred host tree. Similarly, in southern India comprising the states of Kerala, Tamil Nadu and Karnataka, over 60 per cent of the colonies were established on the coconut palm. In the remaining states of northwestern India (Maharashtra, Gujarat, Madhya Pradesh, Uttar Pradesh, Rajasthan, Haryana, Punjab, Himachal Pradesh, and Jammu & Kashmir), acacias are the most preferred hosts. It is also striking that telegraph lines are popular as sites in Assam.

The choice of host trees by baya may be variously motivated, and unless the vegetation and ecology of the various tracts, and the nature of predators, are studied thoroughly, it may not be possible to understand the whole of a situation. It is not always a tree which provides nesting fibre or one that is most common in a locality that is preferred. However, in Kerala, Karnataka, and Tamil Nadu, coconut, the preferred host, is the most common tree and it yields the nesting fibre. But the reason occurring to me is the fact that in this region, people traditionally do not disturb the baya colonies on coconut as some 'wise men' in the past had spread the rumour that the yield of coconut would drop suddenly if baya colonies on them were destroyed. Hence, although the palmyra palms armed with serrated leaf-stalks are abundant in

these states, coconut is mostly preferred. Since coconut cannot protect from tree snakes that are prevalent in this region, as an adaptation the nests are usually provided with very long entrance tubes to prevent snakes reaching the egg-chamber (Davis 1971b).

In the region comprising Orissa, Bihar and West Bengal (south) where palmyra is the preferred host, coconut, arecanut, wild date and acacias are equally common. Palmyra leaf is incidentally too hard for the baya to collect strands from it and hence nests on palmyra are always woven with fibre from other plants. One would, therefore, expect more colonies on acacias or on wild date than on the palmyra. Further, palmyra is the most common tree in Andhra Pradesh. But in this region, most of the colonies are established on wild date. Anyone travelling through Andhra Pradesh can see for himself how the palmyras are cruelly defoliated, leaving only a couple of the very young leaves. Palmyra leaves are traditionally cut for making various articles such as baskets, hats and mats. Past experience of calamities resulting from cutting of leaves hosting nests must have induced the bird in Andhra Pradesh to select trees other than palmyra for nesting. In the northwestern states of India where acacia has been the most preferred host, wild date, which provides fibre, grows abundantly. But acacias are preferred even though they don't provide the nesting fibre. The rainfall of this region is very low and the monsoon commences from July when the rain-fed crops of millets and maize are grown. Moreover, several species of grasses spread their numerous leaves. Sugarcane (where cultivated) also produces large and abundant leaves during the monsoon. All these graminaceous plants supply the leaf strands for woven nests. Moreover, the acacias are usually small trees surrounded by the millet crops, and carrying the leaf strands cannot be a serious problem. Of the acacias, the bird usually prefers those which are surrounded by water. Another factor which seems favourable with acacia is that the foundation for a nest is more easily attached on its twig than on the leaflets of palms. Thus, in spite of the lack of fibre strands, acacia seems to be the most perfect host tree for a baya colony.

The map of India (Fig. 3) further reveals that along the east coast and in Assam, colonies of baya are mainly founded on palms (coconut, wild date, palmyra and areca). Exceptional baya colonies were also noticed on palms such as *Arenga pinnata*, *Caryota urens*, *Hyphaene thebaica*, *Livistona chinensis*, *Phoenix dactylifera*, *P. fariniera* and *Roystonea regia*. This region receives relatively more rain, which is well distributed. Therefore, rivers, ponds and tanks abound here which sustain green vegetation over a greater part of the year. Most of the palms provide nest-weaving fibre round the year. Such a situation induces the baya to have a prolonged nesting season which usually extends from May to early November. On the other hand, the birds in northwestern India,

preferring the acacias for nesting, have a shorter period which extends generally from July to the end of October. The birds in this region must await the monsoon, which commences from July, not only for the supply of insects to feed the young, but also for the nesting fibre which comes mostly from millets and other grasses.

NEST-BUILDING ACTIVITIES OF THE MALE

Nest-building activities in the weaverbirds have been studied by many workers (Ali 1931, Crook 1960b, 1964 ; Collias & Collias, 1962, 1963).

I studied the progress of nest-building in six baya nests of a colony on a palmyra palm located at the northern end of Calcutta by observing them continuously for 12-14 hours daily during April-May from a 5 m high platform (a machan not a hide) erected within 4 m from the host tree. It was flanked to the south 4 m away by a date palm and on the north about 25 m away by a row of five coconut palms. There was a pond on the eastern side. The bamboo platform was due west of the colony from where I could make out clearly whether a bird at a particular time brought a load of coconut fibre, date fibre, a load of mud or nothing at all. After nearly an hour's initial caution, the baya quietly acclimatized and ignored the observer's presence.

Amazingly, a male baya works for twelve to thirteen hours a day during the nesting season, not breaking for more than 30 minutes at a time for foraging, preening, resting or pursuing a female in courtship. If the male has already completed a nest, the site for the new nest is often chosen very close to it. Otherwise, any suitable and strong palm leaflet is selected and one or two small slots or wedges made to fix or tie the initial fibres. In a dicotyledonous plant like *Acacia*, usually the tip of a horizontal thin shoot forms the nesting site. Making the foundation is the most difficult job, which is done by long sugarcane or coconut fibres where available. On the first day, for the construction of the wad and suspension of one of the nests studied, the male brought fibre at the rate of four loads per hour. The initial ring was also formed in the course of the first day itself. From the graph (Fig. 4) it is seen that the frequency of bringing fibre increased steadily when once the nest suspension was completed. On the second day he brought 8 loads per hour, which frequency increased to 26 on the fifth day when the nest was half complete with two distinct openings at the bottom intercepted by a narrow bridge. The latter served as a platform for the bird to perch and rest or work. This stage is usually called the 'helmet' stage and thus it is the home of a 'bachelor' who is yet to acquire a mate. Then, on the fifth day, almost once every two minutes he was able to bring and weave a load of fibre. In addition, the bird visited the nest without any fibre

several times. Such barren visits were at the maximum when he was engaged in luring a female. It is known that a male baya brings loads of mud or cattle-dung and deposits them on the inner walls of the egg-

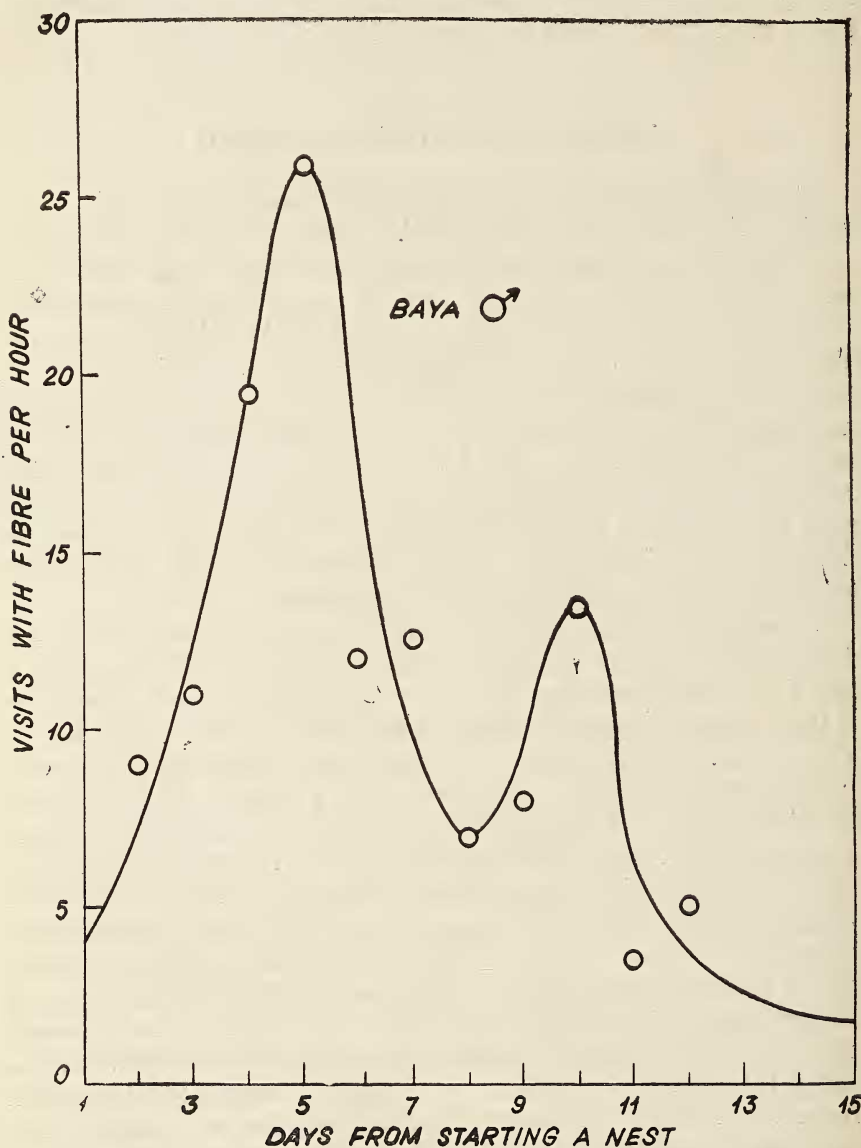


FIG. 4. Graph showing the frequency of male baya's visits to the nest with building material.

chamber (Davis 1972). From the second day of starting a nest such pasty materials are brought, and the frequency of such loads per nest varies with regions. The graph in Fig. 4 does not include the visits with mud or dung which per day was not more than six.

From the sixth day there was a decline in the nest-weaving activity which indicates an important behavioural change. The two openings of the nest continue to remain until its owner is able to secure a mate, for nests are completed only if the hens approve them. At this time the female baya in her egg-laying stage starts visiting the palm in search of a nest and a mate. When a female is sighted from afar, the males of the colony are beside themselves with excitement, and there is a big commotion with hectic flights around the trees. Each male in his nuptial golden plumage displays himself by perching on his nest and fluttering his wings and lifting the nest towards the female. This display is accompanied by a deafening chorus of bird-song and violent flutterings of wings. By the manipulation of the tail, he swings to and fro, often hanging head downward. At the climax, he sometimes reaches the approaching female and escorts her to his nest. The hen, apparently calm and sedate amidst the amorous daylight serenades and chattering advances of the cock, alights on the narrow bridge of the nest. She tests the strength of the nest by poking her beak into the wall and pulling out some fibre as if performing a ritualized test of building standards. During these tense moments, the male watches her hopefully, often chasing off other males who may approach. But after some time the female gets out of the nest and tries another vacant home. She inspects all nests available for occupation likewise, thereby apparently assessing the weaving competence of the males. It is strange that though she is unable to weave a single fibre, she seems competent to judge and select the best nest. The same or the following day she repeats her visit to the nest of her choice, and more frequently thereafter, indicating her willingness to accept the architect of that nest as her mate. The first mating of the pair, usually taking place while the hen is perched on the bridge of the nest, revives the nest-building activity of the cock. During the period when the male entices a hen, he makes several visits to the nest without any fibre. On some days such empty visits may equal the number of loads of fibre brought.

On the eighth day, a cup-like egg-chamber was actively built by closing one of the openings and this activity is shown by the second node in Fig. 4. The four-day period (from the fifth day) represents the cock's intense activities to lure a hen, and such a period is prolonged in the case of the less efficient males not capable of weaving ideal nests. From the second opening, a tubular entrance is woven downwards. The female collects fine feathers or cotton wool and prepares a soft lining in the egg-chamber and lays a clutch of 2-4 eggs. By the end of this period when the nest with its tubular entrance is completed, the cock leaves both nest and hen, and his interest shifts to building another nest for another prospective mate. At a later stage the male makes occasional visits to the original nest to feed the young. Such visits are not shown in the graph.

NEST VISITS OF THE FEMALE

After the short conjugal life, the hen undertakes the strenuous job of hatching the eggs and feeding the young almost single-handed. The incubation period is 12 to 14 days. The female does not sit on the eggs continuously for more than two hours, but gets out and perches on the helmet part of the nest preening and relaxing, or flies away to forage. The frequent interruptions in the brooding seem as if to keep the eggs from overheating. In the Cape Weaver Bird (*Hyphantornis capensis olivaceus*) incubation of the eggs is mostly at night, the warmth from the sun presumably being sufficient during the day. Jayakar & Spurway (1965) recorded another interesting phenomenon with the yellow-wattled lapwing. During the hotter parts of the day, the parent pair cooled the eggs of their clutch by wetting their breasts and bellies in standing water immediately before walking on to the nest.

The day the eggs hatch, the mother baya is visibly excited and she goes in and out of the nest frequently. The broken shells of the eggs are dropped directly beneath the nest. Perhaps one reason for the baya's preference to nest on locations overhanging water is to conceal from enemies the droppings and shells. Now she spends more time nursing and brooding the young, and flies out only during the feeding time in search of food. The first day the hen under observation brought food at the rate of about 3.5 trips per hour and remained active for over twelve hours in the day. On the second day, the frequency increased to 6 per hour, and thereafter as the appetite of the nestlings increased, the mother brought more food at frequent intervals (Fig. 5). On the ninth day she brought food at the rate of 17 times an hour, being the maximum for feeding three nestlings. The frequency of food-visits gradually decreased either due to the decreasing appetite, or possibly the mother brought bigger loads of food. On the seventeenth day, the fledgelings left the nest. In some nests, fledgelings left on the sixteenth day. Very rarely the father brought food, but his visits appeared to be motivated by curiosity rather than responsibility. Ambedkar (1964) reported a fairly high degree of active participation of the cock in feeding the young.

A pair of crows (*Corvus splendens*) nesting on a palmyra palm opposite my home at Calcutta were observed for a month. The graph (Fig. 5) shows that the crow-parents together did not make half the number of food visits as the single baya mother. The baya feeds the young with animal food although the adults mainly eat grain. The crows of this nest were found to feed the young with discarded food and grain from nearby houses. As the baya brings usually one insect or a worm each time, it can satiate only a single nestling in one visit. On the contrary, the crow is able to feed more than one nestling in each visit as the food it carries is easy to share.